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The application of composite GO/PAN membranes for removing surfactants from laundry wastewater

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ABSTRACT

The paper presents the results of research on the use of ultrafiltration composite graphene oxide/polyacrylonitrile (GO/PAN) membranes (containing 0.8% (membrane A), 4.0% (membrane B), and 7.7% (membrane C) w/w of GO in PAN matrix) for removing surfactants from synthetic sewage and real laundry wastewater (LWW). For the preparation of synthetic sewage, anionic surfactants (dodecylbenzenesulfonic acid (DBSA), white sodium soap (SS)) and nonionic surfactants (Triton X-100, Mulan Citro) were selected. Real wastewater came from two different laundries, which used a mixture of nonionic and anionic surfactants (LWW 1) and only nonionic surfactants (LWW 2) in the washing process. The research demonstrated that anionic surfactants positively influenced the functionality of the membranes, increasing the volumetric permeate flux, which for DBSA was ~418 L m^{-2} h^{-1} (membrane A), ~212 L m^{-2} h^{-1} (membrane B), and ~245 L m^{-2} h^{-1} (membrane C) and had slightly lower values for SS. The GO/PAN composite membranes are characterized by a rejection rate of 100% for SS and more than 90% for DBSA and therefore can be used to remove anionic surfactants of LWW 1 (R = 90%–99%).

Keywords: Graphene oxide; Polyacrylonitrile; Composite membranes; Surfactant; Laundry wastewater

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